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PSYCHOLOGY AND SCIENTIFIC METHODS

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# THE THIRTEENTH ANNUAL MEETING OF THE AMERICAN PSYCHOLOGICAL ASSOCIATION

## REPORT OF THE SECRETARY

THE thirteenth annual meeting of the American Psychological Association was held at the University of Pennsylvania, Philadelphia, on Wednesday, Thursday and Friday, December 28, 29 and 30, 1904, in affiliation with the American Association for the Advancement of Science and the American Society of Naturalists. President William James was in the chair at the various sessions. On the morning of Thursday, the 29th, the association met in joint session with the American Philosophical Association; and in the evening of that day the two societies held a smoker at the Colonnade Hotel. The meeting adjourned on Friday afternoon after a vote of thanks for the courtesy and hospitality shown by the representatives of the University of Pennsylvania. At the regular business meeting held on December 29, the following was transacted. Election of officers for 1905: *President*, Professor Mary Whiton Calkins, Wellesley College; *Secretary and Treasurer*, Mr. William Harper Davis, Lehigh University; *Members of the Council to serve for three years*, Professor Lightner Witmer, University of Pennsylvania, and Professor George M. Stratton, Johns Hopkins University. The following new members were elected: Dr. J. W. Baird, Johns Hopkins University; Professor I. Madison Bentley, Cornell University; Mr. Frank G. Bruner, Columbia University; Mr. C. T. Burnett, Bowdoin College; Mr. G. Cutler Fracker, Columbia University; Mr. V. A. C. Henmon, Columbia University; Dr. Edwin B. Holt, Harvard University; Professor Herbert G. Lord, Columbia University; Professor David R. Major, Ohio State University; Dr. W. P. Montague, Columbia University; Professor George R. Montgomery, Carleton College; Dr. Kathleen Carter Moore, 206 North 33d Street, Philadelphia; Professor Colin A. Scott, Boston Normal School; Mr. Luther A. Weigle, Yale University; Dr. William Morton Wheeler, American Museum of Natural History, New York City; Professor

F. J. E. Woodbridge, Columbia University; Dr. Robert M. Yerkes, Harvard University.

Upon recommendation of the Council, Article IV. of the Constitution was amended to read as follows: Annual Subscription—The annual subscription shall be one dollar in advance.

Upon recommendation of the Council it was voted that two dollars of the annual subscription of each member for the year 1905 be remitted.

The Council reported an invitation from Harvard University to hold the next annual meeting in Cambridge to signalize the opening of Emerson Hall. Upon recommendation of the Council it was voted that this invitation be accepted, power being given to the Council to arrange otherwise in case circumstances might arise to make a change of plan desirable.

The report of the Committee on Bibliography which was presented at the annual meeting in St. Louis, in December, 1903, and laid upon the table, was taken up, discussed and referred back to the committee for a further report at the annual meeting of 1905.

A vote of thanks to the retiring Secretary was moved and adopted.

### Report of the Treasurer for 1904.

| | | |
|---|---|---|
| *Dr.* | | |
| To balance at last meeting | $2,013.02 | |
| Dues of members | 423. | |
| | | $2,436.02 |
| *Cr.* | | |
| By expenditures for | | |
| Printing | $ 25.30 | |
| Postage | 20.50 | |
| Stationery | 3.70 | |
| Clerical Assistance | 35. | |
| Telegram | .25 | |
| Exchange | 1.20 | |
| | | 85.95 |
| | | $2,350.07 |
| Accumulated interest on deposits, approximate | | 320. |
| | | $2,670.07 |

LIVINGSTON FARRAND,
*Secretary and Treasurer.*

## ABSTRACTS OF PAPERS

*The Experience of Activity. President's Address:* WILLIAM JAMES.

As contrasted with inactivity, we have activity whenever we experience anything to happen. The word is here synonymous with process or event. Where a process has a direction and tendency, overcomes resistances, etc., we have activity in the completest sense. The notions of agent, effort, passivity, etc., arise in such experiences. The *nature* of activity is wholly given in the experience of it, just as every other elementary nature is similarly given. An activity-series is defined by its whence and whither. But activity-situation is a segment in a longer experience chain; and the more previous activity that gave the push, and the remoter goal that names the whither, are often substituted, as defining a *more real* activity for the activity at first supposed. Our conscious activity-experiences are moreover proved to depend on neural activities of which we are unconscious; and these, since their failure will arrest the others, are in turn considered more real. Thus our immediate feeling of an activity going on may be deceptive as to *whose and what* the activity really is, and we have to define and locate it elsewhere than where it first appeared. But in its new situation, it preserves the old nature, for the word activity can have no other meaning than what experience gives. We place all sorts of other things (as motions, sizes, colors, etc.) wrongly, but our need of translocating them does not expel their natures from the real world; and similarly an activity, to whatever more real source imputed, must either remain in the world as the same *kind* of thing we were originally talking about, or else be talked about under some other name. The fact that activity-experiences of our own may involve or be involved in more real activities, has led some writers to draw a sharp opposition between activity as humanly felt, and activity as an objective fact. They have different natures altogether, we are told, felt activity being an inert resultant and illusion, real activity being an efficacious force. But empiricism should reject this search for a trans-empirical 'activity-in-itself.' Who so feels himself sustaining a tendency against a resistance knows the *what* of activity through and through, and from within. There are other whats in the world, but of other 'activity' we have no right to speak. That activity, moreover, when once rightly located, possesses all the efficaciousness that can anywhere positively be supposed. A tendency successfully sustained against resistance is the original of what we mean by efficacy. Other idea of efficacy than that, we have none. To seek deeper than all experiences for what makes experience *really so* is thus a fallacy. The problems of activity are practical, not metaphysical. Which activities, and whose, are the more real activities in the actual world?—these are the important questions, leading, on the one hand, to a forecast of remoter outcomes, and on the other, to a more exact study of the relations of our *naif* human experiences of activity to the short-span activities, whether neural or conscious, for which they seem to be substitutes.

*Unperceivable States of Consciousness:* A. H. Pierce.

The doctrine of unperceivable sensations and sensation-differences has drawn its vitality for the most part from an argument which makes use of the axiom, if two things are equal to a third thing, they are equal to each other. Stumpf and Stout may be taken as representative advocates of this argument. In experimenting with slightly differing sensations, it frequently happens that two qualities or two intensities seem equal to a third whose stimulus lies midway between those of the other two, while the two sensations themselves are clearly distinguishable. This could not happen, the argument claims, unless the three sensations were actually different, for otherwise the above axiom of equality would be violated. Against this argument it may be urged that whenever the equality-axiom is employed outside of mathematics, its correct statement should be,—two things equal to a third under certain conditions are equal to each other *provided that the same conditions still prevail.* It is this continuance of underlying conditions that we are unable to guarantee when the comparison of sensations is in question. Indeed it seems not unlikely that the cerebral excitations caused by two closely similar stimuli exert upon each other a modifying influence, which is wanting when the difference between the stimuli is increased. Though lacking positive knowledge in the matter, should we not hesitate to base an argument upon the equality-axiom? For it is quite possible that the two sensations are compared with a third, under conditions that do not hold good when the two are compared with each other.

*A Field for the Study of Temperament:* Dickinson S. Miller.

The temperament of authors as traced, not through biographical gossip, but in their writings, proves a fruitful field for study. This is illustrated by the case of two contrasted types of temperament, the classic and the romantic. Five different bases of distinction and consequent definitions have been proposed by literary critics. If we combine these, we see the two types well marked and complete, and looking closer, the psychological basis of the difference. The romantic temperament is marked by an excitable energy that enjoys its excitement; the classic by evenly inhibited energies. Another illustration is found in two curiously contrasted individuals, both of the romantic type, who have evinced an antipathy for each other: Carlyle and Mr. Swinburne. Carlyle's imaginations are characterized by a passion for sensation of the kinesthetic order that accompanies the overcoming of resistance; Mr. Swinburne's by a passion for sensation of a diffused dermal and organic type, such as accompanies exultant movement through unresisting or but slightly resisting media. This divergence goes far to explain the difference of their attitude toward the concrete and the abstract, toward pleasure, and toward liberty.

*Examinations, Grades and Credits:* J. McKeen Cattell.

This paper is published in full in the February number of the *Popular Science Monthly.*

*Perception of Children:* Will S. Monroe.

*Tests of Growth of Mental Efficiency in Children* (by title): E. A. Kirkpatrick.

The six hundred children of the Model and Practice schools are tested every year. The report was upon a perception-motor test of making one hundred marks in fifty squares in which the figures 1, 2 and 3 indicated the number to be made in each square. Very backward children are quickly discovered by the test in the lower grades and there is some reason to believe that the test is valuable as a means of measuring the mental efficiency of younger children at least. Improvement is shown by years and by grades, especially in the lower grades. The effects of the test seem to carry over long intervals, as most of the younger children at least are better in the second and third test given after six months or a year than children of corresponding ages who are taking their first test. Improvement with special practice is very marked, as was shown by a series of experiments on normal students, a girl of seven and a boy of five, the gain after ten trials being 18 per cent., 20 per cent. and 25 per cent., respectively. By practicing four times a day, for a week, the time of the little girl of seven was reduced from 64 to 43 seconds (41 is the average for girls of 14). Two weeks more brought it down to 35, and two weeks more to 30. The daily record was more variable than for adults, indicating that the elements of desire, and the power of self-direction, are important and variable factors in experiments upon children. It also appears that, in the case of children at least, errors are more likely to vary inversely than directly with increase in speed. Further tests will be made to determine the relation of this test, and improvement with practice in it, to other tests and to general mental efficiency.

*Mental and Moral Effects Following the Removal of Adenoids:* Edward A. Huntington.

Three cases were presented which had been prepared in connection with his Psychological Clinic conducted by Professor Witmer at the University of Pennsylvania. These cases were offered as a contribution to the clinical psychology of mental and moral retardation and deficiency. In all the cases, there was a history of mental and moral retardation, and in two cases this was associated with marked physical degeneracy. Naso-pharyngeal adenoids and hypertrophied tonsils were present in each case. The surgical removal of growths and hypertrophic tissues, followed by appropriate school training, resulted in mental and moral improvement. The most striking case was a boy whose mental status was that of a middle-grade imbecile, upon entering Special School No. 3, of which Mr. Huntington is principal. His pedagogical history showed that for three years in which he had been a pupil in the first grade of an elementary school, four different teachers had attempted his instruction and discipline, and each had failed in turn. He was finally expelled and sent to the Special School. Here he was accorded medical treatment, and adequate school training. One year after the removal of the growth, the child was promoted into the work of the second year, and it now seems safe to predict that his future progress will be steady and reasonably rapid.

### *Emotion and Motor-Sensations in Art:* COLIN A. SCOTT.

The fact that the space of consciousness is limited results in a part only of any whole reaction coming to consciousness at any one time. Every reaction is primarily adaptive, but situations occur in which the stimulus arising directly from the reaction is not sufficient to fill the span of consciousness and maintain the scene of a full and abounding life. Lack of interest, pain or ennui results. At this point, however, play or art may save the situation and fill the remainder of the space of consciousness with either perceptional or ideational elements, which do not increase or aid in the adaptive reaction. These form the esthetic or play component. The esthetic reaction is thus never pure, but is always the by-product of some actual adaptive reaction reduced to a minimum. The exploitation of a figure by the movement of the eyes in painting is a part of the adaptive component, and in itself not esthetic. The physical movements in dancing are the reduced minimum of the adaptive movements of walking or running. The sensations of sitting in one's seat and looking at the stage in a theatre represent the adaptive In all such cases, the remainder of the span of consciousness is filled with what is distinctly felt as not aiding or hindering any adaptive reaction. The picture must have no grapes for the birds to pick. Although the drama may stimulate feelings of fear, these must not lead the audience to save themselves by flight. The adaptive component in each case thus acts as an inhibitive agent. This inhibition, however, is confined to action on the environment. Action on one's own body and ideas representing the body are fully exploited in the esthetic reaction. In this direction, motor elements are stimulated and not inhibited. Since the elements of the esthetic reaction are motor states felt to be internal, a reverberation of part evolutionary instincts comes to be an important and characteristic feature. The breadth of these leads to extension in the form of esthetic logic, representing the trend of the emotion, which is ultimately governed by climax or success.

*Knee-Jerks without Stimulation of the Patellar Tendon:* EDWIN B. TWITMYER.

In normal individuals in whom the knee-jerk is readily obtainable, a movement of the opposite limb can usually be observed when only one tendon is tapped. This phenomenon can be satisfactorily explained only as a reflex action. The possibility of eliciting this response when the opposite tendon is struck raised the question whether or not knee-jerks could be elicited without the usual tap on either tendon, *i. e.,* by the activity of some other stimulus. The results of an extended series of experiments upon six subjects were reported. Knee-jerks without taps on the tendons were obtained from all the subjects after a large number of preliminary experiments had been performed, in which a bell was struck 150 $\sigma$ before the blow fell on the tendons. These responses were not the result of voluntary effort on the part of the subject. Attempts to inhibit these kicks were wholly unsuccessful. The movement displayed the characteristic jerky or explosive appearance of the true knee-jerk. The relation between the extent of the kicks of the right and left legs corresponds with the results obtained when the tendons were struck. The relations between the extent of the initial kick out of the legs and the first secondary swing remain constant for each subject, whether the movement follows the blows on the tendons or whether it follows the sound of the bell alone. Preliminary experiments with both the tap of the bell and the blow on the tendons were necessary before kicks could be obtained; with the bell alone, the number varied from 150 to 230 trials. With an increase in the number of experiments performed, the regularity of response with the bell alone was greatly increased. The movement in question can be explained only in terms of reflex action. The afferent excitation must reach the cord at the level of the medulla, and then passes down to the second and third lumbar segment, in which the cell bodies of the afferent conduction paths are located. The repeated association of the functioning of the motor cells of the lumbar segment of the cord upon which the kick immediately depends, with the excitation of centers in the nuclei of the medulla connected with the auditory conduction path, has resulted in the development of an unusual reflex arc. The results of the experiment furnish additional grounds for accepting the view of Erb and his followers as to the nature of the patellar tendon phenomena. No difference whatever is apparent in the character and extent of the movements with and without the blows on the tendons. The two movements differ only in the origin of the excitation and the spinal centers involved.

### *The Analysis of Reaction Movements:* CHARLES H. JUDD.

This paper reported a qualitative, rather than quantitative study of reactions. By means of a suitable apparatus graphic records were secured of all phases of reaction movements. It was found that no reactor lifts his finger from the key in a simple movement. Sometimes the reaction proper comes at the end of a gradual upward or downward movement. Sometimes sudden movements or rhythmical series of movements precede the reaction movement. Sometimes, as Mr. G. W. Smith has already shown, the reactor makes a sudden downward movement before raising the finger. Many of these preliminary phases of reaction can be related to conscious processes, not merely, or chiefly, because they give rise to muscle sensations, but because they express the motor organization in the central nervous system which furnishes the physiological basis for the processes of attention and rising expectation. These processes of attention and expectation are not forms or phases of consciousness depending upon any sensation factors. Nor do they depend on revived content factors. They belong to the conative side of mental life, and are easily understood when it is shown, as in the results reported in this investigation, that there is a fact of nervous expressive activity paralleling each of the manifold variations of attention and expectation arising in reactions.

### *Some Experiments on Lifted Weights Looking Toward a Restatement of the Psycho-Physical Problem:* LIGHTNER WITMER.

Standard weight 100 grams, comparison weights 100, 102, 104, 106 and 108 grams. Time of stimulation 1 second, 2 seconds interval between the periods of stimulation, no greater interval between two pairs of weights lifted than between the lift of each weight of a pair. Thus there was no chronological grouping. It took six seconds to lift each pair of weights, and to give a judgment as to whether the second weight was heavier or lighter than the first. A series, usually of 40 judgments, followed consecutively. The pairs of weights upon which judgment was given were 100:100, 108:100, 100:102, 100:104, 100:106, 102:100, 104:100, 106:100. The subjects were compelled to express a judgment even when the judgment was a mere guess. Equality judgments were not allowed. In case the judgment was a mere guess the subject added 'D' meaning doubt. If his judgment was accompanied by a measurable degree of confidence he added 'A, B, or C.' The following table summarizes the results.

| | H or L | Confidence. | | Doubt. | |
|---|---|---|---|---|---|
| | Cases. | Cases. | Right. | Cases. | Right. |
| 100:100 | 65 | 59 | 61 | 41 | 71 |
| 100:102 | 67 | 62.5 | 66 | 37.5 | 70 |
| 104 | 77 | 66 | 80 | 34 | 75 |
| 106 | 86 | 69.5 | 86 | 30.5 | 85 |
| Average | 77 | 66 | 77 | 34 | 77 |
| 102:100 | 50 | 63 | 58 | 37 | 36 |
| 104: | 56 | 62 | 66 | 38 | 41 |
| 106: | 64 | 67 | 74 | 33 | 43 |
| 108: | 66 | 65.5 | 69 | 34.5 | 53 |
| Average | 57 | 64 | 66 | 36 | 40 |

Each value in the table is the average result of 200 experiments each upon three different subjects. The table shows opposite each pair the percentage of the heavier or lighter cases from 600 experiments, also the percentage of cases given with confidence and with doubt, the percentage of confident cases that were right cases, and the percentage of doubtful cases that were right cases. Thus with the weights 102, 104 and 106 in the second position in a pair, 77 per cent. of the cases were right, 66 per cent. of all the cases were confident judgments, and 34 per cent. were doubtful judgments. Of the confident judgments 77 per cent. were right, while of the doubtful judgments the same number, 77 per cent., were right. With these comparison weights in the first position, but 57 per cent. of the cases were lighter or right cases. Of these cases 64 per cent. were confident judgments of which 66 per cent. were right. 36 per cent. were doubtful of which only 40 per cent. were right.

### *The Order of Tone Sensations:* Hugo Münsterberg.

It seems improbable that a final theory will recognize six light sensations only, but demand ten thousand tone sensations; while to the naïve consciousness, the manifoldness of the visual and of the acoustical fields seems more or less comparable. This striking difference in the theoretical construction is the result of the historical fact that the visual theory has been developed without any reference to anatomical observations, while the theory of hearing has been brought from the beginning under anatomical categories. If we take introspection as our starting point we must consider as qualitative elements those characteristics of the sound which indicate to us the differences of the various sonorous objects. If I hear one sound, I am interested to know merely whether it is sung or played on a piano, comes from violin or trumpet or bell or whistle. Like a color, such an element can change in intensity and can mix with toneless sounds, the noises. But each sound, just like a color, can change in a distance series where every position has meaning only with reference to another member of the series. The drawing has two such dimensions, right-left and up-down; the violin sonata has also two such dimensions, the time-dimension and the pitch-dimension. As the painting combines a number of colors, each one distributed in both dimensions; so the orchestra combines the variety of timbre elements, each varying in time and pitch. The ten thousand strings of the basilar membrane which give the change of pitch, correspond then to the ten thousand or more rods and cones which the light may successively stimulate in going up and down. The objective combination of tones in the simple timbre corresponds to the objective combination of colors in the white light, and the apparent subjective discrimination of overtones is not a real resolution of the clang into elements. The relation between the two tones of an octave or a fifth would then no more be compared with relations between colors, but with relations between the parts of a circle or an ellipse, while the harmony of different instruments would correspond to the harmony of different colors.

*Combination Tones:* F. M. URBAN.

In a clang composed of two tones, one can observe tones the pitches of which are in certain simple relations to the vibration number of the fundamental tones. One tone, which is called summation tone, corresponds to the sum of the vibrations; besides this there exists a tone with the pitch of the difference of the vibrations which forms with the other elements of the clang difference tones of higher order. Difference and summation tones are called combinational tones; the name of *Tartini's* or *Sorge's* tones is less fitting as these acousticians observed only difference tones of first order, the summation tones being observed first by Helmholtz. A merely physical explanation is sufficient for those combinational tones which can be observed in the air outside the ear. This is always possible for the summation tones—although they are so faint that some observers have not noticed them—but for the difference tones it is only possible when they are produced in the same enclosed space. According to this criterion we distinguish subjective and objective difference tones. Helmholtz has adopted the theory that the subjective difference tones have their origin in the ear and that they must arise whenever the vibrations are so large that the second power of the displacement can not be neglected besides the first. The mathematical theory shows further that an elastic body can perform such a movement only if it has a form unsymmetrical to the direction of the vibration; the tympanum is considered to fulfill this requirement. This theory explains only difference tones of the first order but not those of higher order. The requirement of the vibration to have a certain magnitude is only partially justified, as difference tones can be heard most distinctly when the intensity of the fundamental tones does not exceed a certain limit, and is certainly not fulfilled for difference tones of higher order, the intensity of which decreases rapidly. The anatomical relation to the tympanum does not agree with the fact that difference tones can be heard after operative destruction of the tympanum and the ossicles. The insufficiency of Helmholtz's explanation is no proof against the resonance hypothesis, but first of all a new theory of hearing would have to consider the problem of difference tones.

*The Sense of Hearing in Frogs:* ROBERT M. YERKES.

(1) The green frog seldom gives a locomotor reaction in response to sounds, and thus far no characteristic auditory reflexes have been discovered. (2) That the animal hears is clear from the fact that croaking ceases when an auditory stimulus is suddenly given. (3) Experiments show that the reflex reaction to other stimuli, tactual for example, is modified by sounds. When the two stimuli occur simultaneously the reaction to the tactual stimulus is reinforced by the auditory; when the auditory stimulus precedes the tactual (this is possible because the auditory alone never causes a reaction) by more than three tenths of a second, the tactual reaction is partially inhibited. (4) The auditory stimulus modifies the tactual reaction whether the frog be in air or in water, but the influence is lessened as the animal is more and more deeply submerged. (5) Thus far experiments indicate that the range of hearing extends from fifty vibrations per second to at least 10,000. (6) Apparently, hearing is of less importance in the frog than vision. Sounds may serve as warnings of danger, but they do not bring about locomotor or flight reactions as do visual stimuli. (7) The tympanum is much larger in the male than in the female, and as might be expected there is some evidence that sounds produce more marked effects on the males than on the females.

*Some Sex Differences:* R. S. WOODWORTH and FRANK G. BRUNER.

In connection with the anthropometric work of the Department of Anthropology at the St. Louis Exposition, men and women of several races were subjected to sense, motor and mental tests. In the motor tests men surpassed women, though the difference in quickness and in accuracy of movement was much less than in strength. In color perception, on the contrary, women surpassed, and this difference, like that in movement, held good in nearly every race and group examined. In visual acuity there was no uniform sex difference, for while white men saw better than white women, in most other groups the women surpassed. In a 'form test,' which consisted in fitting variously shaped blocks into corresponding holes, and which has proved to be more a test of intelligence than of perception of form, American men and women were about on an equality, whereas in the more primitive peoples the males were distinctly superior to the females.

*Motor Correlations:* R. S. WOODWORTH and H. D. MARSH.

American adults were tested in strength of grip, speed of tapping and accuracy of hand movement. A high degree of correlation (Pearson coefficient $=0.5+$ to 0.82) obtained between the right and left hands of a person in the same test; but a low correlation (0.08 to 0.34) appeared between the different tests of the same hand. In other words, a person's efficiency with one hand in any motor function is a fair index of how well he can do with the other hand; but a person's efficiency in one motor function is scarcely any index of his efficiency in others. The use of the single term, 'motor ability of an individual,' to cover all sorts of motor functions, is therefore misleading.

Abstracts of the papers read by Margaret Floy Washburn on 'Wundtian Feeling Analysis and the Genetic Significance of Feeling'; Dickinson S. Miller, on 'The Mutual Isolation of Minds'; Frederick J. E. Woodbridge, on 'The Nature of Consciousness'; George Trumbull Ladd, on 'A Suggestive Case of Nerve Anastomosis'; and Hugo Münsterberg, on 'The System of Values,' have already appeared in the preceding number of this JOURNAL (Vol. II., No. 2, pp. 47–49).

*The Time of Perception as a Measure of Difference in Sensations:* VIVIAN A. C. HENMON.

Differences in sensations are equal if they are discriminated with equal ease. A measure of the time necessary to perceive differences in sensations is therefore a measure of the differences themselves. In this way it is possible to discover with what differences for consciousness either relatively or absolutely equal objective differences in quality or intensity are correlated. Experiments on qualitative differences in color, equal intermediate steps between orange and red, show that with the equal decrease in differences between two pairs of stimuli goes a markedly greater increase in the differences in the time of perception. The curve of increase agrees very well with that obtained by the usual psycho-physical methods. Experiments on the time of perceiving differences in lengths of lines, in which field Weber's law holds within certain limits, show on the application of Fechner's formula of difference that the differences in the times of perception increase inversely as the logarithms of the quotients of the magnitudes of the stimuli. Individual differences in sensibility and sense deficiencies can be determined by this method. If, for instance, a person be color-blind it will take him a longer time to distinguish the reds and greens than the blues and the yellows. To measure this cards were prepared on one set of which blues and yellows in various shades and tints were mounted, on the other reds and greens, and the time of distribution taken. The person of normal color-vision takes no longer to distribute the reds and greens than the blues and yellows, one deficient in color-sense takes much longer and thus discloses his defect.

### *Additional Experiments on the Photography of the Eye:* G. M. STRATTON.

The experiments here reported were made with the eye viewing a great variety of figures, and the eye's action was mechanically recorded by photographing the movements of a beam of light reflected from the cornea. In addition to the fact that our enjoyment of linear gracefulness can not be attributed to any ease or grace in the eye's own motion—a result already reported in the Wundt *Festschrift*—the present experiments indicate: (1) That the Wundt-Lamansky law of eye-movements is by no means a universally valid formula. While horizontal movements are frequently along lines that are approximately straight, yet vertical movements are much less commonly straight. Diagonal movements frequently approximate the Wundt-Lamansky description, but straight diagonals are by no means rare. (2) The linear illusions of Müller-Lyer, Zöllner and Poggendorff frequently occur with exactly such eye-movements as have been supposed to be their cause. But the illusions also occur in the absence of such movements, and indeed when the very opposite kind of movement is being performed. Therefore any special form of eye-movement is evidently not a necessary condition of the rise of these illusions. (3) In viewing symmetrical figures, the eye's movements are usually unsymmetrical, at least when such figures are most enjoyed. The more symmetrical movements were called out when the observer was in doubt whether the figure was exactly symmetrical. Our enjoyment of symmetry accordingly can not be explained by the balance or pleasure in the eye movements which symmetry invites.

### *Intermittence of Vision:* EDWIN B. HOLT.

The periodically spaced bandings observable on the after-image streak produced by a luminous image travelling on the retina can not be explained by the theory of retinal undulations advanced by Professor Auguste Charpentier. Professor Charpentier's observation, on which he bases his theory, that these bands become narrower and lie nearer together as the image moves more rapidly, is incorrect. The bands follow precisely the opposite law. Neither are these bands due, as has often been said, to the same mechanism as the recurring after-images seen after a momentary exposure of the eye to a stimulus that is not moving; for if they were they would necessarily travel after the moving stimulus, keeping at constant distances behind it. Whereas the bands do not move at all, although the system of bands, as a whole, moves because the rear band is always disappearing, while a new band is being deposited on the front of the system by the moving stimulus. The bands are due to some intermittence of the visual mechanism, whereby the nervous process set up by the moving stimulus is periodically inhibited, so that the stimulus instead of leaving behind it in consciousness a continuous after-image streak, leaves a discontinuous succession of after-images each one of which is of approximately its own size and shape. These several images behave like ordinary after-images: for an instant after their generation they become larger than the retinal image of the object should seem to warrant, and then grow gradually smaller in all dimensions and feebler in intensity, until they fade away. There is no reason for supposing this intermittence to be a function of the retina. Like the many other cases of periodic sensory inhibition it is more probably due to some process in the central nervous centers.

### *The Effect of Eccentric Visual Stimulation on Fixation:* RAYMOND DODGE.

Replying to certain criticisms of his method of photographic registration of the eye movements, Mr. Dodge described the records of a photographic ophthalmometer. Besides constituting data of the most accurate sort for determining the shape of the cornea, these records indicated the importance of certain precautions in the photographic registration of the eye movements by means of the corneal reflection. Since at the extreme periphery the cornea is quite irregular, altogether the most favorable position for the corneal reflection is the optical axis of the cornea or points symmetrically disposed about it. A source of error which menaces alike all exact studies of the eye movements and many apparently unrelated fields of optics is given in the minute but almost continuous involuntary movements of the eyes during so-called fixation. Photographic registration of these errors of fixation shows that, notwithstanding the most elaborate precautions, movements of the head had not been entirely eliminated. Besides the actual displacement of the eyes with the head, the recorded errors showed distinct coordinate compensatory eye movements, more or less exaggerated by the mechanical interference with the head movements. Abstracting from the influence of the head movements there remain marked irregularities in fixation. In one subject involuntary eye movements of unusual amplitude were found in the place of a hitherto undiagnosed astigmatism. The best known effects of eccentric stimulation constitute further disturbances of fixation. Notwithstanding the conviction, based on introspective data, that an eccentric point of interest may be maintained without occasioning actual eye movement, photographic registration showed in every case distinct and characteristic eye movements. Even when not attended to, eccentric stimuli increase the general instability of fixation whenever they notably diminish the clearness of the fixation mark. They may on the other hand serve a very different function. In certain definite relations to the point of fixation they reduce the amplitude of the involuntary eye movements. For all three subjects studied a dot was the most unsatisfactory fixation mark, permitting eye movements of the greatest amplitude with the conviction of accurate fixation. Equally unanimous was the effect of eccentric stimuli in the form of radiating lines. A line diminished the amplitude of transverse involuntary eye movement. The fixation of a line as a whole was less irregular than the attempt to fixate a definite point on the line. The results unequivocally condemn the usual point-like fixation mark, whenever even approximate fixation is required. They also furnish the clearest evidence that normal fixation is not a simple mechanical fact but a relatively complex functional process dependent primarily on the clearness of the visual image.

### *The Fixation of Points in the Visual Field:* CLOYD N. MCALLISTER.

This paper was a report on work done for the purpose of determining the behavior of the eye while fixating points. The observer was required to fixate a simple point for a short time, then move the eyes to the right through an angle of about 10 degrees, to another simple point or to a point from which lines were drawn. Several movements from the simple point to the point on the right and back to the simple point again were recorded for each observer. The records were made with an Edison kinetoscope camera, at the rate of nine exposures per second. During any period of 'fixation' there was a rapid change of position of the eye over a considerable area about the point. The point to be fixated seldom if ever fell upon the exact *fovea centralis*. In moving from one point of fixation to the other, when both points were simple, the distances were not well taken at first and a corrective movement was required; such a movement was not required after the second or third excursion. When the point on the right was surrounded by lines, the fixation was changed in character, the estimation of the distance between the points very uncertain, the direction of the movements between the points disturbed. When a horizontal line cut by three perpendicular lines was fixated at the points of intersection the character of the fixation periods did not differ apparently from the fixation of a simple point, the distance from one intersection to another was correctly taken after two or three trials, and the eye followed the horizontal line very closely in making the movements. The two eyes do not move with perfect symmetry. During any period of fixation the small eye movements, which apparently are muscular tremors, may be in opposite directions, or the lines showing the paths of the movements may be at any angle. The lack of coordination of the movements of the two eyes is emphasized by one record which showed that the right eye had moved through an arc of about 10 degrees to the second fixation point, while the left eye was still at the first point.

*The Fixation Pauses of the Eye in Reading:* WALTER F. DEARBORN.

Photographs made with a modification of the Dodge photographic apparatus of the movement of the eye of different individuals and of the same individual in different readings of the same page show considerable variation in the number, duration, and relative position within the line of fixation pauses, and in the character of the connecting movements. The differences between children and adults were found to be in the general unsteadiness of fixation, and inaccuracy of movement of the former. In the speed of movement, and in the number of fixations they did not differ materially from adults. It appears probable from various irregularities and movements of the eyes even in the case of adults, that fixation is not always a matter of a distinct resting or pause even with several millimeters or letters of the line, but that in successive fixations of the same object any one of the several retinal points lying close to the fovea will satisfy equally well the requirements of what is objectively the same fixation, and that there are also movements of the eyes within these limits which do not denote changes in objective fixation. Secondly, there are more or less distinct pauses or breaks in the movement of the eye which are probably periods of significant stimulation; and, finally, a shifting of the position of the eye due to various causes shows that our conception of what we mean in general by fixation will need to be modified.

### *Psychology of Esthetics: Experimental Prospecting in the Field of the Comic:* LILLIAN J. MARTIN.

This investigation was undertaken for the purpose of becoming directly and personally acquainted with some of the problems involved in that which is termed 'the comic,' and to ascertain by actual trial the possibility of applying satisfactorily certain well know psychological methods to the solution of such problems. The experimental results show: 1, that the comic impression from a picture decreases in the same experiment from moment to moment and in successive experiments from day to day, and that the rapidity with which this occurs depends partly at least upon the complexity of the details; 2, interspersing new pictures between the old, forced or spontaneous laughter, drinking coffee, good physical condition and high spirits, a non-rigid holding of the body and a longer period between the exposures of a given set of pictures, help the comic effect; 3, that time differences may exist when two pictures are successively examined and compared, that is, differences growing out of the fact that one picture is seen before the other; also time influences, that is, differences arising from the unequal loss or gain of fun in the norm and the comparison at the same sitting and successive sittings; 4, that space differences which depend on whether a picture is at a reagent's right or left also exist when two pictures are compared; 5, that a sad or comic fore-picture affects the comic impression received from a given picture; 6, that the direction of the judgments of the degree of funniness and of the tendency to smile and laugh take a similar course; 7, that the presence of a smiling or doleful face in a picture increases its funniness; 8, that increasing the size of a picture and moving it help its funniness; 9, that the method of gradual variations is peculiarly adapted to investigating the particular degree of exaggeration which is most comic; 10, looking at comic and other pictures and listening to jokes increase both the rapidity of the breathing and of the pulse.

### *The Synthetic Factor in Tactual Space Perception:* THOMAS H. HAINES.

An investigation in tactual localization by Weber's second method is reported. The observers were six with normal vision, and seven blind. The object of the experiments was to show the function of the visual image in tactual localization. This is shown by a comparison of average errors on 24 points on the volar surface of the forearm for the normals and for the blind, and for the normal with natural attention, and the same with a special effort at visualization. It is assumed in common with a goodly number of psychologists that the visual factor will show itself in the better localization (smaller error) on the sides of the arm. This effect is manifest in only four of the six normal observers, and in some of these the excess error in the middle is so small as to be attributable to accidental causes. One of the blind observers gives the same result. The normal observers with special effort at visualization also reverse themselves, and give the smallest average error in the middle. The blind observers with the exception of the two, give the smallest error on the *radial* (far) side of the arm. The direction of error is predominantly peripheral and *radial* for the blind, while it varies greatly in the normal, and some of them show different tendencies on different parts of the arm. This coordination of least error on radial side and dominance of radial errors seems to indicate, in a preliminary way, the typical reaction of the blind where the visual image is surely excluded. This is probably due to the greater tactual functional significance of the radial side of the arm. Local signs and inner tactual sensations are thus better coordinated. The introduction of the visual image evens all parts up to this. But the importance of the visual image has been overestimated. It does not have the influence in better localization which has been attributed to it. Introspections of both the blind and seeing observers indicate that the inner tactual sensations of the touching and the touched member play a much more considerable part than has been attributed to them. But the question as to what that part is, an important question not only in tactual space perception but also in individual psychology, is not answered here. The function of this paper was rather to get the question definitely raised.

*The Plot Interest:* WILLARD C. GORE.

Recent discussions of philosophic method, particularly those involving the so-called pragmatic method, have incidentally brought to light wide differences in standpoint, so temperamental, so individual, as to arouse a psychological interest. Philosophy in the making is clearly psychical. It was not the object of this paper to discuss these individual differences in philosophy, but to raise the more general and preliminary problem as to what is the psychical character, the 'mental pattern' of the philosophic interest. For the purpose of raising and to some extent defining this problem the following hypothesis was stated: The type of interest known as philosophic assimilates to that fundamental and familiar type of interest known as plot interest. Philosophic interest and plot interest are related as species and genus. Within the plot interest two types of interest are discriminated. (1) Interest in following, or rather inactively pursuing the course of the plot; interest in a conflict, in suspense, in whatever challenges speculation; in a word, the esthetic interest. (2) Interest in constructing, in weaving the plot; in working it out to a consistent whole; in a word, the artistic interest. These two types are normally alternating and correlative. The isolation of either gives rise respectively to estheticism and to formalism. The esthetic and artistic types of interest prefigure the two limits within which philosophic activity falls; namely, the speculative and the systematizing limits. The speculative, Platonizing interest in philosophy corresponds to the esthetic interest in plot. The systematizing, organizing Aristotelian interest in philosophy corresponds to the artist's interest in plot. The two interests in philosophy are normally correlative and alternating, within the experience of the individual. The isolation of either gives rise respectively to some form of Neo-Platonism or mysticism, on the one hand, and to some form of scholasticism on the other. The affinity of the philosophic interest for the plot interest rests upon the inherent nature of all thinking to be dramatic, in the sense of being the reflection, the rehearsal, of situations involving conflict and readjustment.

*Recent Theories of Genius:* I. WOODBRIDGE RILEY.

The literature of genius during the last two years presents two tendencies: Negative against the Lombrosian or pathological school: positive toward the explanation of genius as a superb synthesis of normal functioning. There is also a popular attempt to make genius a manifestation of the unconscious. The results of these investigations are apparently contradictory. (1) The pathological school (Lombroso, Nordau, Nisbet) makes genius a neurosis of an epileptoid nature, and like insanity a phase of a morbid susceptibility; its opponents say there is here no necessary lack of balance in the cerebro-spinal system (Stanley Hall, Moebius, Flechsig). (2) The physiological school conceives a genius as a higher faculty depending upon a given physical endowment (Allara, Reuda), others say there are certain mysteries of endowment not open to analysis (Jastrow, Nazzari). (3) The social school considers the great man the essence, the index, or the initiator of social progress (Seailles, Joly, Baldwin), against this some hold that the causes of production of great men lie in a sphere wholly inaccessible to the social philosopher (James, Spiller). (4) The subliminal school postulates an extra, subconscious personality with superior memory, imagination and inductive powers (Von Hartmann); on the contrary others assert that such a consciousness is not an inner light, not a peculiar supernormal activity (Fullerton, Jastrow). But the subliminal considered as the minimal consciousness offers the best explanation of the apparent neuropathic or psychopathic characteristics of genius. Recent experiments in the discrimination of auditory and visual stimuli just above the threshold of consciousness might explain, for example, hyperesthesias of genius.

*The Three Types of Religious Consciousness:* F. C. DOAN.

Recent investigations of religious consciousness have exhibited two rather different methods of approach to the field at large. The most popular of these is of course the questionaire method. There begins to recommend itself, however, another method of approach, namely, that which proposes to exhibit the motives underlying comparatively large religio-social groups. This method insists that the data supplied by the large sect, church, tribe, race and world movements are the really significant deposits of spiritual purpose. Both these methods are essentially pragmatic. Reality is held to be religiously significant only in those spots where it has been mellowed by the persistent rappings of spiritual impulses. On the basis of the second of these methods we may say there are three types of normal religious consciousness: the rational, the emotional, and the active or pragmatic. The first of these seeks to fill in the gaps of an otherwise self-contradictory reality with the solid masonry of an unyielding dialectic. The emotional or mystic temperament floats over these gaps by sheer force of good feeling. The pragmatic type avoids the gaps altogether and follows the well-beaten paths of its practical experience of the ultimate. It experiments with its gods. In some cases it retains an assortment of gods each a specialist in his proper field. Sometimes it adopts a surreptitiously deified man of the tribe; sometimes it accepts a becoming god whose affinity is moral rather than ontological. The history of religions is really a record of the almost uninterrupted triumph of the practical over the speculative and emotional in the religious consciousness of the race. Moreover, the religious culture of to-day is more intensely practical than ever before in the history of the race. The paper closed with (1) a classification of great religious movements according to these three types and (2) some suggestions as to the probable physiology of the types.

*An Historic Note on Hypnotism:* BROTHER CHRYSOSTOM.

A. So far as the present writer knows the word *hypnotic* occurs for the first time in English in a curious passage to be found in a book of the seventeenth century. It is entitled 'A Ternary of Paradoxes: The Magnetic Cure of Wounds; The Nativity of Tartar in Wine; The Image of God in Man. Written originally by Joh. Bapt. Van Helmont, and Translated, Illustrated, and Ampliated by Walter Charleton, Doctor in Physick, and Physician to the late King. London. Printed by James Flesher for William Lee, dwelling in Fleetstreet, at the sign of the Turkshead, 1650.' This is the *second* impression. The passage in question occurs in ¶ 154 of the tract on the 'Magnetic Cure of Wounds' and reads: "To this series belongs the subductive virtues of Cathartic or Purgative, the somniferous faculty of *Hypnotick* or dormitive *medicaments*, etc." I have been unable to find a copy of the Latin original of Van Helmont, and, therefore, I do not know whether the term was coined by Dr. Charleton. B. In Harper's 'Metaphysics of the School,' Vol. III., Pt. I., pp. 350, 351, and footnote, occurs in interesting application of Baron von Reichenbach's theory of the *od* to the question of indistancy, with corollaries referring to the 'evil eye,' animal magnetism, hypnotism, etc. As a relaxation one may then take up Gautier's 'La Jettatura,' which is capitally written. C. The relation of Hypnotism to fundamental principles of philosophy and theology is probably best treated by the Dominican professor Coconnier in his thoughtful book, 'L'hypnotisme frano.'

## REVIEWS AND ABSTRACTS OF LITERATURE

*Balance: The Fundamental Verity.* ORLANDO J. SMITH. Boston, Houghton, Mifflin and Company, 1904. Pp. 279.

The author has adopted the plan followed by Descartes in publishing his Meditations and, having sent advance copies of this work to various scholars, has incorporated their criticisms in his book, together with his own final rejoinder. The result is that the appendix, in which these criticisms are reproduced, although it contains twenty-eight separate recapitulations of the author's argument by as many reviewers, is nevertheless very interesting reading by reason of the variety of *Weltanschauungen* thus placed side by side, the contrasted habits of mind displayed by the critics, and the dialectic stimulus given to the reader.

In the original essay, which makes up about half of the book, the author seeks to establish the real harmony of science and religion by showing that they rest upon an identical law. Starting with the general aspects of nature, he reduces causation, gravitation, evolution, the indestructibility of matter, the persistence of force, the eternity of motion and the uniformity of nature to the one law: to every action there is an equal and opposite reaction. The highest generalization of science is, accordingly, 'that Balance rules the world.' Chemical activity, man's relation to nature, history, economics, ethics and logic are then briefly reviewed, and this same law is pointed out in each. Passing to religion,